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Indian Standard
SPECIFICATION FOR
DIRECT READING POINTER INDICATOR
TYPE AC/DC ELECTRONIC VOLTMETER
PART III UP TO 300 MHz

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 1

Indian Standard

SPECIFICATION FOR DIRECT READING POINTER INDICATOR TYPE AC/DC ELECTRONIC VOLTMETER

PART III UP TO 300 MHz

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*Shri Y. Venkataramiah was Chairman for the meeting in which this standard was finalized.

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Indian Standard
SPECIFICATION FOR
DIRECT READING POINTER INDICATOR
TYPE AC/DC ELECTRONIC VOLTMETER

PART III UP TO 300 MHz

0. FOREWORD

0.1 This Indian Standard (Part III) was adopted by the Indian Standards Institution on 7 December 1972, after the draft finalized by the Electronic Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 The provisions of this standard apply to the complete apparatus and not to component parts thereof.

0.3 This standard (Part III) should be used in conjunction with IS : 6767 (Part I)-1972*.

0.4 Assistance has been derived from the following while preparing this standard:

IEC Pub 217 Electronic voltmeter. International Electrotechnical Commission.

BS 4205 : 1967 Specification for electronic voltmeters, British Standards Institution.

0.5 This standard is one of a series of Indian Standards on electronic measuring equipment. A list of standards so far published in this series is given on Page 10.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Specification for direct reading pointer indicator type ac/dc electronic voltmeter: Part I Methods of measurements.

†Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part III) lays down the minimum performance requirements and characteristics to be specified for direct reading pointer indicator type ac/dc electronic voltmeter operating up to 300 MHz.

1.2 The climatic and mechanical durability requirements for these voltmeters are under consideration.

2. TERMINOLOGY

2.1 For the purpose of this standard the definitions and explanation of terms specified in 2 of IS : 3437-1972* shall apply.

3. CONSTRUCTIONAL REQUIREMENTS

3.1 The provisions of 3 of IS : 3437-1972* shall apply as modified by **3.1.1**.

3.1.1 The panel-meter shall have a minimum 100 divisions, each division being of 0.8 mm width.

4. WORKMANSHIP AND FINISH

4.1 The provisions of 5 of IS : 3437-1972* shall apply.

5. CONTROLS AND ADJUSTMENTS

5.1 The provisions of 6 of IS : 3437-1972* shall apply.

6. POWER SUPPLY

6.1 The provisions of 7 of IS : 3437-1972* shall apply.

7. CHARACTERISTICS OF ELECTRONIC VOLTMETERS

7.1 Basic Characteristics

7.1.1 Accuracy Class — The accuracy classes of 1.5 and 2.5 are covered in this standard (see also **2.8.2** and **4.1** of IS : 3437-1972*).

7.1.2 Permissible Intrinsic Error — The permissible intrinsic error under reference conditions and between the limits of the effective range shall be ± 1.5 percent or ± 2.5 percent.

7.1.3 Voltage Range

7.1.3.1 DC voltage range — The instrument shall be capable of measuring dc voltages from 1 V full scale deflection up to 300 V full scale deflection in suitable ranges.

*General requirements for direct reading pointer indicator type electronic voltmeter (first revision).

7.1.3.2 AC voltage range — The instrument shall be capable of measuring ac voltages from 1 V full scale deflection up to 300 V full scale deflection in suitable ranges.

7.1.3.3 The instrument may also be calibrated in decibels and a separate dB scale shall be provided.

7.1.3.4 The ratings of effective ranges shall preferably be chosen from the following basic series or their decimal multiples or factors (*see 3.4.1 of IS : 3437-1972**):

- a) 1, $\sqrt{10}$, 10 (for voltage and dB); and
- b) 1, 3, 10 (for voltage).

7.1.4 Calibration — The calibration shall be for rms values. If it is otherwise, such as peak, average or logarithmic, it shall be indicated on the instrument.

7.1.5 Type of Input — The type of input shall be single ended. Other types of input such as symmetrical or differential may be provided.

7.1.6 Input Admittance/Impedance

7.1.6.1 For dc ranges — Input resistance shall be at least 1 000 megohms.

7.1.6.2 For ac ranges — The ac input impedance expressed in terms of its equivalent parallel, resistive and reactive components at 1 MHz shall be as follows:

Input resistance — 1 megohm, *Min*

Input capacitance — 3 pF, *Max*

7.1.7 Warm-Up Period — The time taken by the instrument to attain good stability within the intrinsic error specified shall not be greater than 15 minutes.

7.2 Other Characteristics

7.2.1 Deviation of Electrical Zero — The permissible shift of deviation of electrical zero for the two classes of voltmeters covered by the standard (*see 7.1.2*) shall be as specified in Table 1 for various influence quantities.

7.2.2 Variation in Indication — The permissible variation in indication for the two classes of voltmeter covered by the standard (*see 7.1.1*) shall be as specified in Table 2 for various conditions.

*General requirements for direct reading pointer indicator type electronic voltmeter (first revision).

TABLE 1 SHIFT OR DEVIATION OF ELECTRICAL ZERO

(Clause 7.2.1)

SL. NO.	INFLUENCING QUANTITY	REF TO CL NO. OF IS : 6767 (PART I) - 1972*	SHIFT OR DEVIATION OF ELECTRICAL ZERO	
			Class Index 1·5	Class Index 2·5
(1)	(2)	(3)	(4)	(5)
i)	Ambient temperature change	5.6	± 1·5	± 2·5
ii)	Supply voltage change:	5.5		
a)	First sudden 5 percent variation (maximum shift)		± 0·75	± 1·25
b)	Second sudden 5 percent variation (final shift)		± 1·5	± 2·5
iii)	Fluctuation	5.1	± 0·75	± 1·25
iv)	Drift	5.2	± 1·5	± 2·5
v)	Applied input voltage	5.3		
vi)	Change of range	5.4	± 1·5	± 2·5

Note — The deviation of electrical zero shall be expressed as percentage of the total length.

*Specification for direct reading pointer indicator type ac/dc electronic voltmeter: Part I Methods of measurements.

7.2.3 Damping — The damping of a voltmeter characterized by its overshoot and settling time shall be measured in accordance with 9 of IS : 6767 (Part I) - 1972* and shall specify the following requirements:

- a) *Overshoot* — Under the test conditions, the overshoot shall not exceed the upper limit of effective range.
- b) *Settling time* — Under the test conditions the time required for the index to attain its final steady position within 1·5 percent of the upper limit of the effective range shall not exceed 4 seconds.

7.2.4 Errors Due to Overload

7.2.4.1 When subjected to the continuous overload test in accordance with 10.1 of IS : 6767 (Part I) - 1972*, the voltmeter shall comply with the requirements of its specified accuracy.

*Specification for direct reading pointer indicator type ac/dc electronic voltmeter: Part I Methods of measurements.

TABLE 2 VARIATION INDICATION

(Clause 7.2.2)

SL No.	INFLUENCING QUANTITY (1)	REF TO CL NO. OF IS : 6767 (PART I)-1972*	VARIATION IN INDICATION	
			Class Index 1·5 (4) percent	Class Index 2·5 (5) percent
i)	Position	6.1	$\pm 1\cdot5$	$\pm 2\cdot5$
ii)	Ambient temperature change	6.2	$\pm 1\cdot5$	$\pm 2\cdot5$
iii)	External magnetic field:	11		
	a) When specified by the manufacturer		$\pm 1\cdot5$	$\pm 2\cdot5$
	b) At 0·5 millitesla (when not specified by the manufacturer)		$\pm 3\cdot0$	$\pm 3\cdot0$
iv)	External electric field	12		Under consideration
v)	External RF electromagnetic field	13		Under consideration
vi)	Supply voltage change:	6.3		
	a) First sudden 5 percent variation (maximum variation)		$\pm 0\cdot75$	$\pm 1\cdot25$
	b) Second sudden 5 percent variation (final variation)		$\pm 0\cdot75$	$\pm 1\cdot25$
vii)	Super-imposed input voltage (see Note):	6.4		
	a) On ac, 1 000 times dc voltage being applied		$\pm 1\cdot5$	$\pm 2\cdot5$
	b) On dc, 1·2 times ac voltage being applied		$\pm 1\cdot5$	$\pm 2\cdot5$
viii)	Frequency of measured voltage:	8		
	a) Over 40 Hz to 30 MHz		$\pm 1\cdot5$	$\pm 2\cdot5$
	b) Over 20 Hz to 300 MHz		$\pm 3\cdot0$	$\pm 5\cdot0$
ix)	Fluctuation (random and spurious variation)	6.5	$\pm 0\cdot75$	$\pm 1\cdot25$
x)	Drift	6.6	$\pm 1\cdot5$	$\pm 2\cdot5$

*Specification for direct reading pointer indicator type ac/dc electronic voltmeter:
Part I Methods of measurements.

IS : 6767 (Part III) - 1972

7.2.4.2 When subjected the test for overload for short duration in accordance with **10.2** of IS : 6767 (Part I)-1972*, the voltmeter shall comply with the requirements of its specified accuracy.

8. MARKING

8.1 The provisions of **8** of IS : 3437-1972† shall apply in addition to **8.1.1**.

8.1.1 The instrument may also be marked with the ISI Certification Mark.

NOTE—The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

9. TECHNICAL DOCUMENTATION TO BE SUPPLIED WITH THE INSTRUMENT

9.1 The provisions of **9** of IS : 3437-1972† shall apply.

*Specification for direct reading pointer indicator type ac/dc electronic voltmeter
Part I Methods of measurements.

†General requirements for direct reading pointer indicator type electronic voltmeter
(first revision).

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- 2321-1963 Requirements for general purpose amplitude modulated radio frequency signal generators (30 kc/s to 30 Mc/s)
- 2711-1966 Direct reading pH meters (*revised*)
- 3437-1972 General requirements for direct reading pointer indicator type electronic voltmeter (*first revision*)
- 3886-1966 Minimum requirements for general purpose audio frequency signal generators (30 c/s to 30 kc/s)
- 3915-1966 Methods of measurements on audio frequency signal generators (30 c/s to 30 kc/s)
- 4309-1967 Methods of measurement on direct reading pH meters
- 4330-1967 Methods of measurement on cathode-ray oscilloscope (dc to 10 Mc/s)
- 6700-1972 Requirements for general purpose cathode-ray oscilloscope
- 6756-1972 Technical documentation to be supplied with electronic measuring equipment
- 6767 (Part I)-1972 Direct reading pointer indicator type ac/dc electronic voltmeter:
Part I Methods of measurements
- 6767 (Part II)-1972 Direct reading pointer indicator type ac/dc electronic voltmeter: Part II Up to 30 MHz
- 6767 (Part III)-1972 Direct reading pointer indicator type ac/dc electronic voltmeter: Part III Up to 300 MHz
- 6769 (Part I)-1972 Direct reading pointer indicator type ac electronic millivoltmeter: Part I Methods of measurements
- 6769 (Part II)-1972 Direct reading pointer indicator type ac electronic millivoltmeter: Part II With a frequency range of 2 Hz to 1 MHz
- 6804-1972 Glass electrodes for direct reading pH meters

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Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 1

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